

BLACK HAWK MODERNIZATION



Army ACAT ID Program

Number of Systems by FY24:	1,480
UH-60A:	Phased out
UH-60L:	1
UH-60M:	1,221
UH-60X:	255
Total Program Cost (60L) (TY\$):	\$11.5B
Average Unit Cost (60L) (TY\$):	\$5.0M
Full-rate production:	
UH-60A (Completed):	4QFY82
UH-60L (Complete in FY05):	2QFY88
UH-60M:	3QFY03
UH-60X (Currently unfunded):	2QFY04

Prime Contractor

Sikorsky Aircraft
General Electric

SYSTEM DESCRIPTION & CONTRIBUTION TO JOINT VISION 2020

The UH-60 BLACK HAWK is a single rotor, medium-lift helicopter that provides utility and assault lift capability in support of the full spectrum of combat and peacetime missions. The BLACK HAWK is the primary helicopter for air assault, general support, and aeromedical evacuation. Additionally, BLACK HAWKS can be configured to perform command and control, electronic warfare, and special operations missions. The versatility of this widely used aircraft provides significant *dominant maneuver* and *focused logistics* capabilities.

BACKGROUND INFORMATION

The Army began fielding the UH-60A in 1978. Over ten years, the Army procured about 1,050 UH-60A model aircraft. A 1989 power train upgrade resulted in a model designation change from UH-60A to UH-60L. Since 1989, the Army has procured 505 of the newer UH-60L models but has not modernized the previously fielded UH-60A aircraft. Procurement of 65 more UH-60L BLACK HAWKs is funded through FY05. Depot-level overhaul of up to 390 of the oldest aircraft is slated to begin in 2002.

The Army approved a new Operational Requirements Document in January 2000 that established a two-tiered approach to development and modernization. The near-term first tier aircraft, the UH-60M, will extend airframe service life while providing a Force XXI digital cockpit and improved reliability and maintainability for the BLACK HAWK fleet. The second tier requirements establish the UH-60X BLACK HAWK with increased performance and survivability capabilities. The UH-60X aircraft will include a more powerful engine and better aircraft survivability equipment. New engine technology should provide increased shaft horsepower and greater fuel efficiency. Survivability will be enhanced by the installation of the Suite of Integrated Radio Frequency Countermeasures and the Suite of Integrated Infrared Countermeasures and by improving the ballistic damage tolerance of the fuel subsystem, flight controls, and the main and tail rotor systems.

TEST & EVALUATION ACTIVITY

The Army successfully developed, integrated, and operationally tested a medical evacuation BLACK HAWK, the UH-60Q, with a digital cockpit that will be the baseline for the UH-60M. While finding that pilot situational awareness was enhanced significantly, the Army also discovered electromagnetic interference problems in the UH-60Q cockpit during operational testing. Follow-on electromagnetic environmental effects (E3) testing should soon show that subsequent integration and modifications have eliminated the problem.

Working in concert with industry, the Army has conducted flight testing of the wide chord blade (WCB) and the advanced flight control computer (AFCC). Both technologies will be installed on the UH-60M. The WCB offers increased lift, range, and speed as well as reduced procurement costs compared to the current BLACK HAWK blades. The AFCC provides the same functionality and will replace the existing obsolete flight control computer.

While not required for the UH-60M program, the Army's Aviation Applied Technology Directorate has tested improved infrared suppressors that could make the modernized BLACK HAWK less susceptible to infrared seekers. The PM has indicated that the UH-60M will have an improved IR suppressor system.

In May 2000, OSD approved the TEMP for tier one (UH-60M) testing of the BLACK HAWK modernization program. On August 31, 2000, OSD (AT&L) waived the requirement for full-up, system-level live-fire test and evaluation based on an alternate plan approved by DOT&E. This alternate plan will meet all testing and evaluation requirements in a realistic, practical, and cost-effective manner. Subsequent to that TEMP approval, the Army has modified its tier one acquisition strategy by extending EMD by two years and inserting an LRIP decision prior to the full rate production decision.

TEST & EVALUATION ASSESSMENT

It is highly probable that the Service will be able to deliver the expected system performance within the current budget and schedule. However, there are areas of concern.

The Army anticipates that replacing the UH-60A with the UH-60M will result in operations and support (O&S) savings. Intuitively, it makes sense that older aircraft would have higher O&S costs than new/rebuilt aircraft. However, a query of the Army's cost data on the UH-60A and UH-60L models has not yet confirmed this premise. Nevertheless, we anticipate that the O&S cost of the UH-60M will be comparable to the O&S costs of the UH-60L. The aircraft components, especially propulsion and airframe that comprise 85 percent of O&S costs, will be similar on the two models. The UH-60L cockpit accounts for only 10 percent of total O&S costs, so unless the UH-60M digital cockpit is dramatically less reliable, it will not be a cost driver. Since the test program will not provide enough cost data to estimate the true O&S costs of the UH-60M aircraft, conclusions about O&S cost savings for the UH-60M will likely be based on extrapolations of O&S data from the UH-60L and UH-60A.

The primary technical risk for the UH-60M is avionics. This risk will be mitigated by the Army's recent success in development and testing of the digital cockpit in the UH-60Q. From an operational perspective, it will be a challenge to explicitly demonstrate the operational benefits of the digital cockpit. The link between improved situational awareness and effectiveness is tenuous at best. Demonstration of faster and more accurate or complete digital communications, improved avionics reliability, and more accurate navigation may provide the best indications of enhanced operational effectiveness. The test program should provide ample opportunity to evaluate the digital cockpit.

The advantages of the WCB may be partially offset by an increase in vibration fatigue. Flight testing of the WCB on UH-60L aircraft has revealed vibrations at primary and secondary frequencies that have been described by the testers as noticeably different from current blades, but acceptable. We do not know what these vibrations will be like with the stiffened airframe of the UH-60M. The WCB is being used on commercial aircraft, such as the Sikorsky S-92.

Uncertainties about the specifics of how the airframes will be reinforced during remanufacture have led to questions about aircraft weight projections. At this stage in the program, the PM does not yet have proposed designs on how the airframe will be stiffened. Generally, the PM's plan is to reinforce those airframe members known to have frequent failures on fielded aircraft. But until a specific design has been accepted, weight projections will not be reliable. The projected increase in power from the WCB cannot accommodate additional weight beyond the known increase in weight due to the digital cockpit and other approved enhancements. Therefore, aircraft weight poses a risk to aircraft performance and cost.

The alternative LFT&E plan will be conducted in two sequential phases. The first phase will consist of ballistic vulnerability tests performed on individual components. The second phase will address system-level vulnerability. An operational, but not necessarily flight worthy, UH-60A or L-model ground test vehicle configured with M-model components will be used during the latter phase.

The LFT&E plan takes into account vulnerability reduction features that have been incorporated into the BLACK HAWK since its initial fielding in 1978. This plan also will use combat damage experience, subsystem qualification efforts, computer modeling and simulation, as well as sister Services' testing on similar aircraft. The LFT&E program will take advantage of ongoing Navy (SH-60R and CH-60 programs) LFT&E activities and is in the process of negotiating some cost-sharing of the required testing. The LFT&E effort is scheduled to be conducted from FY00-FY03.

